Electricity and Magnetism, Japan, NMIJ (National Metrology Institute of Japan)

All CMCs were approved on 18 October 2004

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	Instrument or Artifact	Instrument Type or Method	Minimum Value	Maximum Value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?	Uncertainty matrix	NMI service identifier	Comments
DC voltage sources: single values	Josephson array standard	Indirect comparison via a solid state voltage standard	1.018	1.018	V	Temperature	23 °C	8	nV	2	87%	No		1	Traceable calibration service is available from accredited laboratories by JCSS. Refer http://www.nite.go.jp
DC voltage sources: single values	Solid state voltage standard	Direct measurement by the reference	1	1.018	V	Temperature	23 °C	7	nV	2	95%	No		2	Traceable calibration service is available from accredited laboratories by JCSS. Refer http://www.nite.go.jp
DC voltage sources: single values	Solid state voltage standard	Direct measurement by the reference	10	10	V	Temperature	23 °C	30	nV	2	94%	No		3	Traceable calibration service is available from accredited laboratories by JCSS. Refer http://www.nite.go.jp
DC voltage ratios: up to 1100 V	Resistive divider	Comparison with the reference	100 V / 10 V	100 V / 10 V		Temperature	23 °C	1.9E-07		2	91%	Yes		4	Traceable calibration service is available from accredited laboratories by JCSS. Refer http://www.nite.go.jp
DC voltage ratios: up to 1100 V	Resistive divider	Comparison with the reference	1000 V / 10 V	1000 V / 10 V		Temperature	23 °C	2.6E-07		2	92%	Yes		5	Traceable calibration service is available from accredited laboratories by JCSS. Refer http://www.nite.go.jp
DC resistance standards and sources: low values (<= 1 Ω)	Fixed resistor	Thomas type standard resistor	1	1	Ω	Fluid	oil	20	nΩ	2	95%	No		6	Traceable calibration service is available from accredited laboratories by JCSS. Refer http://www.nite.go.jp
						Temperature	20 °C, 23 °C, 25 °C								

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty								
Quantity	**Instrument or Artifact**	**Instrument Type or Method**	**Minimum Value**	**Maximum Value**	**Units**	**Parameter**	**Specifications**	**Value**	**Units**	**Coverage Factor**	**Level of Confidence**	**Is the expanded uncertainty a relative one?**	**Uncertainty matrix**	**NMI service identifier**	**Comments**
DC resistance standards and sources: intermediate values (> 1 Ω to 1 MΩ)	Fixed resistor	Esi-104 type standard resistor	10	10	kΩ	Temperature	23 °C	0.2	mΩ	2	95%	No		7	Traceable calibration service is available from accredited laboratories by JCSS. Refer http://www.nite.go.jp
AC voltage ratio	Inductive voltage divider	Comparison with the reference	0	1		Frequency	1 kHz	1.0E-09		2	95%	No		8	Traceable calibration service is available from accredited laboratories by JCSS. Refer http://www.nite.go.jp
						RMS voltage	10 V								
AC/DC voltage transfer: AC/DC transfer difference at medium voltages	Thermal voltage converter	AC/DC comparison	2	5	V	Frequency	10 Hz to 1 MHz	2 to 24	μV/V	2	95%	Yes	NMIJ-ACDC1	9	Traceable calibration service is available from accredited laboratories by JCSS. Refer http://www.nite.go.jp
AC/DC voltage transfer: AC/DC transfer difference at higher voltages	Thermal voltage converter	AC/DC comparison	5	20	V	Frequency	10 Hz to 1 MHz	3 to 30	μV/V	2	95%	Yes	NMIJ-ACDC2	10	Traceable calibration service is available from accredited laboratories by JCSS. Refer http://www.nite.go.jp
RF power: calibration factor on coaxials	Power meter	Thermistor mount and thermo-electric sensor: 7mm coaxial line	0.9	1		Frequency	0.01 to 18 GHz	0.0034 to 0.01		2	95%	No	NMIJ-RF1	11	Traceable calibration service is available from accredited laboratories by JCSS and ASNITE-NMI. Refer to http://www.nite.go.jp/asse/iajapan/en/whats_lab/list.html
						Power level	10 mW								
						Temperature	23 °C								
RF power: calibration factor on coaxials	Power meter	Thermistor and thermo-electric sensor: 2.9 mm coaxial line	0.9	1		Frequency	0.01GHz to 40 GHz	0.005 to 0.012		2	95%	No	NMIJ-RF2	12	
						Power level	10 mW								
						Temperature	23 °C								

Electricity and Magnetism, Japan, NMIJ (National Metrology Institute of Japan)

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Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty							
Quantity	**Instrument or Artifact**	**Instrument Type or Method**	**Minimum Value**	**Maximum Value**	**Units**	**Parameter**	**Specifications**	**Value**	**Units**	**Coverage Factor**	**Level of Confidence**	**Is the expanded uncertainty a relative one?**	**Uncertainty matrix**	**NMI service identifier**	**Comments**
RF power: calibration factor on waveguides	Power meter	Thermistor mount: bolometer bridge	0.9	1		Frequency	10 GHz	0.004		2	95%	No		13	Traceable calibration service is available from accredited laboratories by JCSS and ASNITE-NMI. Refer to http://www.nite.go.jp/asse/iajapan/en/whats_lab/list.html
						Power level	10 mW								
						Temperature	23 °C								
RF voltage and current: RF voltage meters	Thermistor mount: calibration factor	Bolometer bridge	0.9	1		Frequency	10 MHz to 1000 MHz	0.003 to 0.006		2	95%	No		14	Traceable calibration service is available from accredited laboratories by JCSS and ASNITE-NMI. Refer to http://www.nite.go.jp/asse/iajapan/en/whats_lab/list.html
						Voltage	0.5 V								
						Temperature	23 °C								
RF voltage and current: RF voltage meters	RF voltage meters	Comparison with standard thermistor mount	0.5	0.5	V	Frequency	10 MHz to 1000 MHz	0.0016 to 0.007	V	2	95%	No		15	Traceable calibration service is available from accredited laboratories by JCSS and ASNITE-NMI. Refer to http://www.nite.go.jp/asse/iajapan/en/whats_lab/list.html
						Temperature	23 °C								
Scalar RF attenuation: attenuation on coaxials	Variable attenuator with matching pads	IF substitution method	0	100	dB	Frequency	0.01 GHz to 12 GHz	0.002 to 0.2	dB	2	95%	No		16	Traceable calibration service is available from accredited laboratories by JCSS and ASNITE-NMI. Refer to http://www.nite.go.jp/asse/iajapan/en/whats_lab/list.html
						Temperature	23 °C								

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Quantity	**Instrument or Artifact**	**Instrument Type or Method**	**Minimum Value**	**Maximum Value**	**Units**	**Parameter**	**Specifications**	**Value**	**Units**	**Coverage Factor**	**Level of Confidence**	**Is the expanded uncertainty a relative one?**	**Uncertainty matrix**	**NMI service identifier**	**Comments**
Scalar RF attenuation: attenuation on waveguides	Waveguide below cutoff attenuator	IF substitution method	0	100	dB	Frequency	30 MHz	0.002 to 0.2	dB	2	95%	No		17	Traceable calibration service is available from accredited laboratories by JCSS and ASNITE-NMI. Refer to http://www.nite.go.jp/asse/iajapan/en/whats_lab/list.html
						Temperature	23 °C								
Antenna properties: antenna factor	Linear dipole	Standard antenna method	-50	35	dB (1/m)	Frequency	30 MHz to 1000 MHz	0.7	dB	2	95%	No		18	Traceable calibration service is available from accredited laboratories by ASNITE-NMI. Refer to http://www.nite.go.jp/asse/iajapan/en/whats_lab/list.html
						Environment	horizontal above ground plane								
						Height	2 m								

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Uncertainty matrix: NMIJ-ACDC1

AC/DC voltage transfer: AC/DC transfer difference at medium voltages. Internal identifier: 9

	10 Hz to 40 Hz	40 Hz to 200 Hz	200 Hz to 20 kHz	20 kHz to 100 kHz	100 kHz to 500 kHz	500 kHz to 1 MHz
2 V to 5 V	7	3	2	2	9	24

The expanded uncertainties given in this table are expressed in μV/V.

Electricity and Magnetism, Japan, NMIJ (National Metrology Institute of Japan)

Uncertainty matrix: NMIJ-ACDC2

AC/DC voltage transfer: AC/DC transfer difference at high voltages. Internal identifier: 10

	10 Hz to 40 Hz	40 Hz to 200 Hz	200 Hz to 20 kHz	20 kHz to 100 kHz	100 kHz to 500 kHz	500 kHz to 1 MHz
5 V to 10 V	9	3	3	3	10	27
10 V to 20 V	11	3	3	3	11	30

The expanded uncertainties given in this table are expressed in μV/V.

Electricity and Magnetism, Japan, NMIJ (National Metrology Institute of Japan)

Uncertainty matrix: NMIJ-RF1

RF power: calibration factor on coaxials. Internal identifier: 11

	10 MHz	10 MHz to 6 GHz	6 GHz to 11 GHz	11 GHz to 18 GHz
0.9 to 1	0.0065	0.0034	0.004	0.01

The expanded uncertainties given in this table are dimensionless.

Electricity and Magnetism, Japan, NMIJ (National Metrology Institute of Japan)

Uncertainty matrix: NMIJ-RF2

RF power: calibration factor on coaxials. Internal identifier: 12

	10 MHz to 12 GHz	12 GHz to 30 GHz	30 GHz to 40 GHz
0.9 to 1	0.005	0.008	0.012

The expanded uncertainties given in this table are dimensionless.